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Letter to the Editor

Are Saharan dust intrusions increasing the risk of meningococcal meningitis?

Winds from the Sahara–Sahel region of Africa transport large amounts of dust across North Africa and the Mediterranean to Southern Europe,[1] increasing ambient air dust concentrations that may last several days.[2] Saharan dust clouds may have important implications for health. A study conducted in Barcelona, Spain found that during Saharan dust intrusions the effect of the coarse fraction of the particulate matter increased daily mortality.[3] In the Sahel region of Africa the coincidence of meningitis epidemics and seasonal upsurges in endemic disease with dry dusty conditions has prompted the suggestion that these are also associated.[4–6] However, no study on the incidence of meningitis and Saharan dust events has been conducted in a developed setting with frequent Saharan dust intrusions.

The effects of Saharan dust intrusions on the risk of having meningococcal meningitis in Barcelona were explored using a time-series design. Daily confirmed cases of meningitis from January 1, 2002 to December 31, 2009 were collected. Since 1997 the Spanish notifiable disease surveillance system has classified cases of meningococcal disease as confirmed when *Neisseria meningitidis* is isolated from a sterile site in a person presenting with a compatible clinical disease.[7] A total of 219 cases were reported for the study period, ranging from zero to one daily-case. Days on which air masses from the Sahara–Sahel region were transported to the north-east were identified using back-trajectory analysis (Hysplit model), information from NRL SKIRON and BSC-DREAM dust maps, and satellite images provided by the NASA SeaWiFS.[2,3] The effects of Saharan dust intrusions were investigated with up to 1-month lag using an unconditional logistic time-series regression adjusted for seasonal patterns, fitting sine and cosine functions and a linear long-term trend,[8] and meteorological variables, fitting daily mean temperature, relative humidity, and rainfall.

The strongest risk was found for a lagged effect of 28 days after a Saharan dust intrusion (odds ratio 1.392, 95% confidence interval 1.152–1.681). This had a small *p*-value providing evidence for a relationship even after a conservative Bonferroni correction. Other studies have shown a similar lag-period, where low humidity and increasing intensity of the Harmattan during an epidemic in Nigeria were correlated with a rise in hospital admissions for meningococcal meningitis 1 month later.[4] However, the precise mechanisms may be difficult to identify. Whilst the incubation period for meningococcal meningitis is usually less than 1 week it seems unlikely that its relationship with a delay of 4 weeks after a Saharan dust intrusion will be direct. Climatic variables are likely to be inter-correlated with other processes, which may in turn influence the risk of meningitis, such as changes in human behavior that are conclusive to the spread of infection, or it may influence the risk of concurrent upper-respiratory tract infection, which may affect the risk of disease.[6] We should also consider that the outbreaks in Africa have mainly been meningococcal cases of serogroup A, whereas here we only found isolated cases of serogroups B and C.

Although we are concerned that our finding could still be due to a spurious relationship, the health impact of dust events needs to be further explored, monitoring the impact of Saharan dust intrusions and environmental changes on the occurrence of infectious diseases related to climate change in Southern Europe.

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Conflict of interest: No conflict of interest to declare.

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Aurelio Tobías[a,*]
Joan A. Caylà[b]
Jorge Pey[a]
Andres Alastuey[a]
Xavier Querol[a]
[a]*Institute of Environmental Assessment and Water Research (IDAEA), Spanish Council for Scientific Research (CSIC), C/ Jordi Girona 18-26, E-08034 Barcelona, Spain*
[b]*Epidemiology Service, Public Health Agency of Barcelona, Barcelona, Spain*

Corresponding Editor: William Cameron, Ottawa, Canada
*Corresponding author. Tel.: +34 93 400 61 00; fax: +34 93 204 59 04
E-mail address: aurelio.tobias@idaea.csic.es (A. Tobías)

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